Exponential Growth 7.6 p425

Exponential Growth

- something is increasing exponentially
- ie. bacteria growth, popcorn popping, amount of $ in a savings bond

$P(n) = P_0(1+r)^n$

$P(n)$ = pop # / Principle Amount $

$P(0)$ = pop at time 0 / Amount of $ Deposited originally

r = r is the growth rate

n = growth periods

May 14-8:05 AM

Ex 1

A bacteria strain doubles in number every three minutes. If there are 1000 bacteria initially, how many will there be after 0.25h?

$P(n) = P_0(1+r)^n$

$P(n) = ?$

$P(0) = 1000$

r = every 3 minutes $\Rightarrow$ doubles (100%) 1.0

$n = 0.25h \Rightarrow 15\ min/3 = 5$

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$P(n) = P_0(1+r)^n$

$P(n) = 1000(1+1)^5$

$P(n) = 1000(2)^5$

$P(n) = 1000(32)$

$P(n) = 32000$

There is a population of 32 000 bacteria after 0.25h.

May 14-10:25 AM

The city of Mississauga has experienced rapid growth in recent years. It had a population of 234 975 in 1975 and 610 700 in the year 2000. Determine the annual growth rate of the population between 1975-2000.

$P(n) = P_0(1+r)^n$

$P(n) = 610\,700$

$P(0) = 234\,975$

$r = ?\%$

$n = 25$ years

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$P(n) = P_0(1+r)^n$

$610\,700 = 234\,975(1+r)^{25}$

$\frac{610700}{234975} = (1+r)^{25}$

$2.60 = (1+r)^{25}$

$\sqrt[25]{2.60} = 1+r$

$1.04 = 1+r$

$1.04 - 1 = r$

$0.04 = r$

$4\% = r$

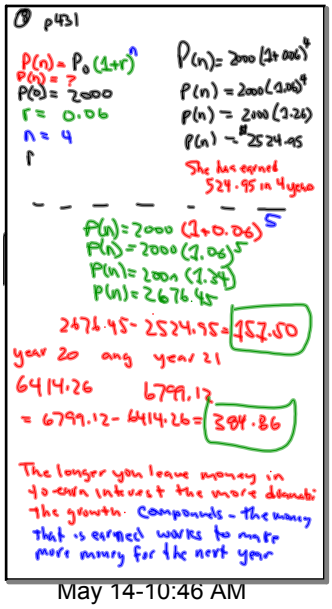
2ND $x\sqrt{\ }$ 1 25 $x\sqrt{\ }$ 2.60 = 1.04

The city grows at a annual growth rate of 4% over 1975-2000.

May 14-10:37 AM

8. Mari invests $2000 in a bond that pays 6% per year.
   a) Write an equation that models the growth of her investment.
   b) How much money does she have if she cashes the bond at the end of the 4th year?
   c) How much will the bond be worth at the end of the 5th year? How can you determine the amount earned during the 4th year?
   d) Determine the amounts Mari will earn at the end of the 20th and 21st years to find the amount earned during the 20th year.
   e) Compare the money earned in the 4th and 20th years. What does this tell you about exponential growth?

Dec 6-8:57 AM



May 14-10:46 AM

$P(n) = P_0(1+r)^n$

After 20 years

$= 2000(1+0.06)^{20}$

$= 2000(1.06)^{20}$

$= 2000(3.21)$

$= 6414.27$

She has earned 4 414.27 over the 20 years on her investment

May 14-10:51 AM

p429-432

q 2, 3, 4a, 7, 10, 11, 12

May 14-10:55 AM

(11) $P(n) = P_{(0)}(1+r)^n$

$P(n) =$

$P(0) = 4$

$r = 200\%$ (triples) $\therefore 2.0$

$n = 20$ $300/15 = 20$

$P(n) = 4(1+2)^{20}$

$P(n) = 4(3)^{20}$

$P(n) = 4(3486784401)$

$P(n) = 1.39 \times 10^{10}$

May 25-10:27 AM

Apr 29-10:17 AM